

CLAIMS

1. An apparatus for producing a trip signal to activate a circuit breaker in an alternating current power line, said apparatus comprising:
 - a sensing circuit operable to sense values representing:
 - a phase difference between current and voltage in said power line; and
 - a current amplitude in said power line;
 - a comparison circuit operable to compare said sensed values of phase difference and current amplitude with a trip characteristic defining fault conditions and non-fault conditions and to generate a fault indication signal when a fault condition arises;
 - a fault discriminator operable in response to said fault indication signal to generate a fault identifying signal discriminating between:
 - a first class of fault in which a mean current value after said fault indication increases relative to a mean current value before said fault indication; and
 - a second class of fault in which a mean current value after said fault indication does not increase relative to a mean current value before said fault indication; and
 - a trip signal generator responsive to said fault identifying signal and operable to generate said trip signal.
2. The apparatus according to claim 1, wherein said alternating current power line carries a three phase alternating current power supply.
3. The apparatus according to claim 1 or 2, wherein said trip signal generator generates a trip signal when said fault identifying signal identifies that said fault indication is due to said first class of fault occurring.
4. The apparatus according to claim 1, 2 or 3, wherein said first class of fault is a short circuit.
5. The apparatus according to claims 2 and 4, wherein said short circuit is a phase-to-phase short circuit.

6. The apparatus according to claim 1 or 2, wherein, when said fault identifying signal identifies that said fault condition is due to said second class of fault occurring, said trip signal generator generates a trip signal if said fault discriminator determines
5 that said fault condition has persisted for longer than a predetermined time.

7. The apparatus according to claim 1 or 2, wherein, when said fault identifying signal identifies that said fault condition is due to said second class of fault occurring, said fault discriminator generates a state indication signal discriminating between a
10 second class of fault caused by:

a first state in which there is loss of current for a period following said fault indication followed by restoration of current to a level corresponding to the current level before said fault indication; and

a second state in which there is loss of current for a period following said fault indication followed by a current at a level lower than the current level before said
15 fault indication.

8. The apparatus according to claim 7, wherein said first state is due to switchgear series arcing.

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9. The apparatus according to claim 7, wherein said trip signal generator generates a trip signal when said state indication signal identifies that said fault indication is due to said second state occurring.

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10. The apparatus according to claim 9, wherein said second condition is an increase in the resistance of a circuit comprising said power line.

11. The apparatus according to claim 10, wherein said second condition is series arcing due to a defective connection.

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12. A method for producing a trip signal to activate a circuit breaker in an alternating current power line, said method comprising the steps of:

sensing values representing:

a phase difference between current and voltage in said power line; and

- a current amplitude in said power line;
- comparing said sensed values of phase difference and current amplitude with a trip characteristic defining fault conditions and non-fault conditions;
- generating a fault indication signal when a fault condition arises;
- 5 discriminating, in response to said fault indication signal, between:
 - a first class of fault in which a mean current value after said fault indication increases relative to a mean current value before said fault indication; and
 - a second class of fault in which a mean current value after said fault indication does not increase relative to a mean current value before said fault
- 10 indication;
- generating a fault identifying signal in response to said discriminating; and
- generating a trip signal in response to said fault identifying signal.